Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

POND SEALING OR LINING - CONCRETE

CODE 522

(sf)

DEFINITION

A liner for an impoundment constructed using reinforced or nonreinforced concrete.

PURPOSE

This practice is installed to–

- Reduce seepage losses from impoundments constructed for water conservation and environmental protection.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where—

- In-place natural soils have excessive seepage rates.
- Construction of a compacted soil liner is not feasible with available soils.
- Use of impoundment requires concrete both as a liner and a protective subgrade cover.

CRITERIA

General Criteria Applicable to All Purposes

Select the concrete liner design for either 'reduced seepage' or 'liquid tight' criteria, depending on the site conditions and management needs.

Liquid tight

Where liquid tightness is required to provide an additional level of protection for geologic concerns, groundwater resources and risk factors as described in the Agricultural Waste Management Field Handbook (AWMFH), Chapter 10, building code requirements must be one of the following:

- Structural Engineering, NRCS National Engineering Manual (NEM) Part 536, Structural Engineering.
- Requirements for Environmental Concrete Structures, Slabs-on-Soil, American Concrete Institute (ACI) 350 Appendix H.

Reduced seepage

Where liquid tightness is not required, building code requirements must be one of the following:

- ACI 318, Building Code Requirements for Reinforced Concrete, ACI.
- ACI 330R, Guide for the Design and Construction of Concrete Parking Lots, ACI.
- ACI 360R, Guide to Design of Slabs-on-Ground, ACI.

Construction joints
Design construction and isolation joints to meet the appropriate ACI code specified above. Protrusions through the liner, such as pipes, must be properly sealed.

Side slopes
Design side slopes of the pond or impoundment to be stable during construction and throughout the service life of the structure. Proportion the concrete mixture for a sufficiently stiff mix that can be installed on the slope without slumping or bulging.

Foundation and liner protection
For waste storage impoundments, design foundation conditions for concrete liners in accordance with NRCS Conservation Practice Standard Waste Storage Facility (Code 313). Consider the location and proximity of ground water and bedrock in the design.

All sites with highly permeable material or fractured bedrock must be evaluated by a geologist or other individual with similar training.

CONSIDERATIONS

Consider texturing concrete surfaces to provide traction for rubber-tired equipment.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for a concrete liner for a pond or a waste storage impoundment that describe the requirements for applying the practice to achieve its intended purpose. Record all required information in an engineer field book, on a plan sheet or design computation sheet, or in another appropriate location. As a minimum, include—

DESIGN DATA

- Completed Environmental Evaluation and subsequent requirements.
- Soils and geologic investigation, including subgrade.
- Standard Cover Sheet (VA-SO-100A).
- Plan view of site with existing and planned features, including dimensions, distances, utilities, etc.
- Survey data: profile, cross-sections, and topography, as needed.
- Design computations, including purpose of practice and references used.
    - Foundation preparation
    - Quality control criteria
- Concrete and reinforcing requirements.
- Quantities of concrete and reinforcement as specified.
- Subgrade preparation, materials and compaction.
- Construction and material specifications (VA Conservation Practice Specifications (700 Series).
- Safety requirements.

CHECK DATA

- As-built survey.
- As-built plans, including dimensions, types and quantities of materials installed, and variations from the design. Include justification for variations.
- Completed as-built section of Cover Sheet.

OPERATION AND MAINTENANCE

Maintenance activities required for this practice consist of those operations necessary to prevent and/or repair damage to the concrete liner. This includes, but is not limited to—

- Visually inspecting liner annually.
- Excluding animals.
- Repairing damage to concrete liner, as necessary. Repairing liner to its original condition.
- Preventing damage from roots of tree and large shrubs by removing such vegetation at first appearance.
- Preventing and/or repairing rodent damage to concrete subgrade.

REFERENCES

- American Concrete Institute (ACI), Farmington Hills, MI
- ACI 318, Building Code Requirements for Reinforced Concrete
- ACI 330R, Guide for the Design and Construction of Concrete Parking Lots
- ACI 350, Appendix H, Requirements for Environmental Concrete Structures, Slab-on-Soil
- ACI 360, Design of Slabs on Grade